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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/008,406	11/13/2001	Grigore C. Burdea	1419-151 US	2975

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EXAMINER

SOTOMAYOR, JOHN

ART UNIT	PAPER NUMBER
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3714

DATE MAILED: 12/04/2003

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/008,406

Applicant(s)

BURDEA ET AL.

Examiner

John L Sotomayor

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9-15 and 36 is/are allowed.
- 6) ☒ Claim(s) 1-8, 16-35 and 37-51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7. 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1,2,5,7,23-25,27-30,33,35,41-45 and 50, are rejected under 35 U.S.C. 102(b) as being anticipated by Burdea et al (US 5,429,140).

Regarding claim 1, Burdea et al discloses a system with a sensing means adapted for sensing the position of one or more digits of a hand, force feedback means for applying and measuring force feedback to one or more digits in relation to the palm of a hand, a virtual reality simulation with a virtual image of virtual objects moveable by the user to virtually simulate exercises, and force feedback means controlled to move one or more digits to a position represented by a virtual image or to apply force feedback to one or more digits (Col 3, lines 1-34, Col 4). Burdea et al discloses a sensor to detect the position of the digits of a hand (Col 3, lines 5-7). Burdea et al also discloses a virtual reality glove connected to diagnostic hardware for measuring the position of a human appendage (Col 4, lines 1-15) and outputting sensor data to a virtual reality display that is then analyzed and used to update the position of the portions of the appendage as displayed (Col 4, lines 20-35).

Regarding claim 2, Burdea et al discloses an exercise in which the exercise is a range of motion (Col 4, lines 4-20).

Regarding claim 5, Burdea et al discloses an exercise in which the exercise is a strength exercise (Col 4, lines 20-23).

Regarding claim 7, Burdea et al discloses that the sensor means is a sensor glove.

Regarding claims 23 and 24, Burdea et al discloses that the force feedback means is through a force feedback glove (claim 23) and that the force feedback glove comprises actuators coupled to one or more digits (claim 24) (Col 3, lines 16-33).

Regarding claim 25, Burdea et al discloses that force feedback glove comprises a plurality of sensors each coupled to a plurality of actuators (Col 4, lines 60-65).

Regarding claims 27 and 28, Burdea et al discloses that measured sensor data from the plurality of sensors is stored in a computer database (Col 4, lines 20-50).

Regarding claim 29, Burdea et al discloses a method with a sensing means adapted for sensing the position of one or more digits of a hand in a virtual image, force feedback means for applying and measuring force feedback to one or more digits in relation to the palm of a hand, a virtual reality simulation with a virtual image of virtual objects moveable by the user to virtually simulate exercises, determining performance of the user from sensor data, and updating a virtual image in response to a user's performance (Col 4, lines 20-35 and Col 5, lines 1-5).

Regarding claim 30, Burdea et al discloses an exercise in which the exercise is a range of motion (Col 4, lines 4-20).

Regarding claim 33, Burdea et al discloses an exercise in which the exercise is a strength exercise (Col 4, lines 20-23).

Regarding claim 35, Burdea et al discloses that the sensor means is a sensor glove.

Regarding claim 41, Burdea et al discloses an exercise in which the exercise is a strength exercise and that the force feedback means is through a force feedback glove (Col 4, lines 20-23).

Regarding claims 42 and 43, Burdea et al discloses that the force feedback means is through a force feedback glove (claim 42) and that the force feedback glove comprises actuators coupled to one or more digits (claim 43) (Col 3, lines 16-33).

Regarding claim 44, Burdea et al discloses that the force feedback glove further comprises a plurality of sensors each coupled to a plurality of actuators (Col 4, lines 60-65).

Regarding claim 45, Burdea et al discloses a method of sensing the position of a plurality of digits during interaction with a virtual image, optionally applying force feedback to one of the plurality of images and measuring position of a tip of the digits, determining the performance of the user from the plurality of sensor data, and updating the plurality of virtual images in response to said performance of the user (Col 5 and 6).

Regarding claim 50, Burdea et al discloses a method of sensing the position of a plurality of digits during interaction with a virtual image, optionally applying force feedback to one of the plurality of images and measuring position of a tip of the digits, determining the performance of the user from the plurality of sensor data, updating the plurality of virtual images in response to said performance of the user, a data storage site for storing the virtual images and performance data, and a remote data access site for viewing the stored information (Col 5 and 6).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 3,4,6,8,31,32,34, and 46-49, are rejected under 35 U.S.C. 103(a) as being unpatentable over Burdea et al in view of Kramer et al (US 6,413,229).

5. Regarding claims 3,4,31 and 32, Burdea et al does not specifically disclose that the exercise performed is a speed of motion exercise (claims 3 and 31) or a fractionation exercise (claims 4 and 32). However, Kramer et al teaches a system with a force feedback glove may be used to test both rapid motion and individual digit motion such that a user may even be “taught” how to play an instrument while wearing the glove (Col 9 and 10). Therefore, it would have been obvious to one of ordinary skill in the art to provide a system and method for rehabilitation

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of neuromotor disorders of a user as disclosed by Burdea et al with the means to perform speed of motion and fractionation exercises as a part of a rehabilitation method as taught by Kramer et al for the purposes of producing a rehabilitation method with a wider range of use in rehabilitation of individual hand injuries.

6. Regarding claims 6 and 34, Burdea et al does not specifically disclose that an exercise is executed with the thumb. However, Kramer et al teaches a force feedback glove with the ability to exercise all of the digits of a user, including the thumb (Col 14, lines 30-60).). Therefore, it would have been obvious to one of ordinary skill in the art to provide a system and method for rehabilitation of neuromotor disorders of a user as disclosed by Burdea et al with a force feedback glove with the ability to exercise all of the digits of a user, including the thumb as taught by Kramer et al for the purposed of enabling complete hand rehabilitation through the flexion of all fingers and the thumb.

7. Regarding claim 8, Burdea et al does not specifically disclose that a measurement from the group of measurements including the metacarpophalangeal joint may be captured. However, Kramer et al teaches that a system may be designed to apply greater force and measurements captured from the metacarpophalangeal joint (Col 3, lines 35-44). Therefore, it would have been obvious to one of ordinary skill in the art to provide a system and method for rehabilitation of neuromotor disorders of a user as disclosed by Burdea et al incorporating a plurality of measurements from the force feedback glove that include a measurement from the metacarpophalangeal joint as taught by Kramer et al for the purposes of capturing data from all of the major joints to measure improvement in an individual therapy treatment plan.

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8. Regarding claims 46 and 49, Burdea et al discloses a system and method for sensing position for a plurality of digits of a hand, applying force feedback to the digits and collecting sensor data after force feedback is applied, determining performance of the individual from sensor data, and updating a plurality of virtual reality images in response to performance of the individual (Col 3, 4, and 5). Burdea et al does not specifically disclose that the exercise performed is a speed of motion exercise or a fractionation exercise. However, Kramer et al teaches a system with a force feedback glove may be used to test both rapid motion and individual digit motion such that a user may even be “taught” how to play an instrument while wearing the glove (Col 9 and 10). Therefore, it would have been obvious to one of ordinary skill in the art to provide a system and method for rehabilitation of neuromotor disorders of a user as disclosed by Burdea et al to perform speed of motion and fractionation exercises as a part of a rehabilitation method as taught by Kramer et al for the purposes of enabling a virtual reality rehabilitation method with a wider range of use in rehabilitation of a plurality of physical infirmities.

9. Regarding claims 47-48, Burdea et al does not specifically disclose that the interaction of the patient with virtual images is repeated a predetermined number of times (claim 47) or that force feedback is repetitively applied a predetermined number of times (claim 48). However, Burdea et al does disclose that therapeutic sessions are monitored by a doctor or therapist and that this plurality of sessions, including the range of motion exercises prescribed by a medical specialist, are planned in advance and recorded for later study (Col 4). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to repeat interaction with

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virtual images or the application of force feedback a predetermined number of times in response to a planned therapy session for an individual.

10. Claims 16-19, 26, and 37-39, are rejected under 35 U.S.C. 103(a) as being unpatentable over Burdea et al in view of Kramer et al in further view of Lamson (US 6,425,764).

11. Regarding claims 16-19 and 37-39, Burdea et al discloses virtual physical therapy that includes a range of motion exercise. Kramer et al teaches a virtual system in which speed of movement exercises are used to assist an individual (Col 10). Burdea et al does not disclose, nor does Kramer et al teach a range of motion exercise that simulates a window wiper movement (claims 16 and 37), a speed of movement exercise that simulates catching a first ball at the change of color of a signal light (claims 17 and 38), a speed of motion exercise in which a virtual hand interacts with a virtual butterfly (claim 18), or a speed of motion exercise in which a virtual hand interacts with two virtual balls (claims 19 and 39). However, Lamson teaches a virtual system in which physical therapy utilizes virtual objects that may be squeezed or dropped, and in which virtual therapy interactions may be designed, based upon research, which can be used to achieve cognitive, emotional and physiological rehabilitation (Col 26, lines 1-15) and the implementation of the therapeutic actions within the virtual space is a matter of design choice based upon research into those methods which show increased self-efficacy for the individual user (Col 26, lines 16-28). Therefore, it would have been obvious to one of ordinary skill in the art to provide a system and method for rehabilitation of neuromotor disorders of a user as disclosed by Burdea et al with a virtual system in which speed of movement exercises are used to assist an individual as taught by Kramer et al with a range of exercises that simulate a window wiper movement, a speed of movement exercise that simulates catching a first ball at the change

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of color of a signal light, a speed of motion exercise in which a virtual hand interacts with a virtual butterfly, or a speed of motion exercise in which a virtual hand interacts with two virtual balls as taught by Lamson for the purposes of providing a virtual therapy system that may be tailored to an individual to increase self-efficacy in the therapy sessions designed for each individual.

Regarding claim 26, Burdea et al does not disclose nor does Kramer et al teach a virtual reality system and method used to provide therapy for individuals who have had a stroke. However, Lamson teaches that virtual reality therapy is psychotherapeutic for individuals who have suffered a stroke (Col 12, lines 56-67). Therefore, it would have been obvious to one of ordinary skill in the art to provide a system and method for rehabilitation of neuromotor disorders of a user as disclosed by Burdea et al with a range of psychotherapeutic actions for individuals who have suffered a stroke as taught by Lamson for the purposes of providing a virtual therapy means that produces interactive feedback for individuals who have suffered physical disability due to a stroke.

12. Claims 20-22 and 40, are rejected under 35 U.S.C. 103(a) as being unpatentable over Burdea et al in view of Kramer et al in further view of Fisslinger (US 5,720,619).

Regarding claims 20-22 and 40, Burdea et al discloses a strength exercise (claim 21), but does not disclose a control associated with color. Kramer et al discloses fractionation exercises (claims 20 and 40), including teaching an individual to play an instrument such as a keyboard (Col 10), but does not disclose a control associated with color (claim 22). Burdea et al does not disclose, nor does Kramer et al teach color changes depending upon achievement during performance. However, Fisslinger teaches a multi-media assisted biofeedback unit that utilizes

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color changes to differentiate desired performance outcomes for an individual using the system (Col 2, lines 47-65). Therefore, it would have been obvious to one of ordinary skill in the art to provide a system and method for rehabilitation of neuromotor disorders of a user as disclosed by Burdea et al and taught by Kramer et al with means for utilizing color changes to differentiate desired performance outcomes for an individual using the system as taught by Fisslinger for the purposes of providing readily identifiable visual feedback in the virtual space of achievement in physical performance.

Allowable Subject Matter

Claims 9-15 and 36 are allowed. The prior art does not teach or suggest a sensor glove that provides one or more measurements from the group consisting of: metacarpophalangeal joint angle of a thumb of one or more digits and a finger of said one or more digits, proximal interphalangeal joint angle of a thumb of said one or more digits and a finger of said one or more digits, finger abduction and wrist flexion in combination with the other limitations of the claims (as shown in claims 9-12) or, a system and method for rehabilitation of a neuromotor disorder with the establishment of one or more targets from the performance of a user and means for displaying said one or more targets to the user in combination with the other limitations of the claims (as shown in claims 13-15 and 36).

Response to Arguments

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In response to applicant's arguments, the applicant presents the argument that Burdea et al do not show a measurement of the position of one or more digits of the hand and the tip of the one or more digits with relation to the palm of the hand. However, Burdea et al presents the teaching of "an instrument to detect the position and force exertable by the digits of the affected hand" (Col 3, lines 5-7) and to "measure the position and force exerted by the fingers" (Col 3, lines 18-19). It is the Examiner's position that it is inherent that a medical device required to measure both position and force exerted by the digits of a hand would utilize the palm of the hand as the baseline to measure the position against and that the tips of the digits are included in the broader category of "fingers".

In addition, the virtual reality system utilizes the sensor data from the diagnostic hardware to draw a visual display of the position and force exerted by a patient whose hand is encased by a sensor glove. The virtual reality display cannot display a representation of force feedback use without updating the display using the sensor information provided by the diagnostic hardware. The capability to update a virtual reality display is inherent in the functional capabilities of a virtual reality display system.

The remaining arguments presented by the applicant are addressed in the above rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Gillio (US 5,800,178) for a discussion of updating a virtual reality display from a medical device based upon the force feedback from sensors attached to peripherals of said device.

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Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John L Sotomayor whose telephone number is 703-305-4558. The examiner can normally be reached on 6:30-4:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Hughes can be reached on 703-308-1806. The fax phone number for the organization where this application or proceeding is assigned is 703-746-8361.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4558.

Tom Hughes
SPE, AU 3714

jls
November 24, 2003